

We claim

1. A process for the preparation of (+)2-(4-chlorophenyl)-3-methyl butanoic acid which comprises reacting (\pm)2-(4-chlorophenyl)-3-methyl butanoic acid (CPA) with a resolving agent comprising an amine in a hydrophobic/hydrophilic organic solvent in the presence
5 of water, separating the desired amine salt and refining the salt with the same solvent system used for resolution and recovering the desired (+)CPA and undesired (-)CPA and amine resolving agent.
2. A process as claimed in claim 1 wherein the resolution is conducted by treating racemic CPA with an amine to precipitate a salt of one enantiomer of CPA.
- 10 3. A process as claimed in claim 1 wherein the solvent is selected from the group consisting of an aliphatic, cycloaliphatic, aromatic hydrocarbon, hydroxylic solvent and any mixture thereof.
4. A process as claimed in claim 3 wherein the solvent is selected from the group consisting of methanol, ethanol, propanol, isopropanol, butanol, iso-butanol, tert-butanol, toluene
15 and any mixture thereof.
5. A process as claimed in claim 4 wherein the solvent is selected from the group consisting of butanol, propanol, water and any mixture thereof.
6. A process as claimed in claim 1 wherein the amine resolving agent is an optically active amine.
- 20 7. A process as claimed in claim 6 wherein the optically active amine is an arylamine containing 8 to 20 carbon atoms.
8. A process as claimed in claim 7 wherein the arylamine is selected from the group consisting of α -phenyl- β -(p-tolyl)ethylamine, α -phenyl- β -phenylethylamine, α -phenylethylamine and N,N-dialkyl α -phenylethylamine.
- 25 9. A process as claimed in claim 7 wherein the arylamine is selected from the group consisting of N,N dimethyl, N, N diethyl, N,N dipropyl, N,N diisopropyl, N-methyl, N-ethyl and higher alkyl amines.
10. A process as claimed in claim 7 wherein the aryl amine is (S)(-) α -phenylethylamine.
11. A process as claimed in claim 1 wherein the amine resolving agent is used in amount of
30 0.4 to 0.65 mole per mole of (\pm)CPA.
12. A process as claimed in claim 1 wherein the amine is added in neat form or in the form of solution.
13. A process as claimed in claim 1 wherein the amine is added in one lot or over a period of time ranging from 10-60 minutes.

14. A process as claimed in claim 1 wherein the amine is added at a temperature in the range of 30 to 100°C.
15. A process as claimed in claim 1 wherein the amine is added to the racemic CPA solution.
16. A process as claimed in claim 1 wherein the racemic CPA solution is added to the amine.
- 5 17. A process as claimed in claim 1 wherein the solvent used is in the range of 20-40% as aqueous solution and two to three times by weight based upon the amount of CPA used.
18. A process as claimed in claim 1 wherein the resolution reaction is carried out over a period of 2 to 6 hours.
19. A process as claimed in claim 1 wherein the amine salt formed is substantially in the form
10 of a precipitate.
20. A process as claimed in claim 1 wherein the temperature range during separation of optically active salt is in the range of ambient temperature to 80°C.
21. A process as claimed in claim 1 wherein the crystallized salt is separated by filtration or centrifugation.
- 15 22. A process as claimed in claim 1 wherein the optically active amine salt obtained is refined in a hydrophilic solvent selected from the group consisting of methanol ethanol, propanol, isopropanol, butanol, 2-butanol, tert butanol and an aqueous mixture thereof.
23. A process as claimed in claim 22 wherein the hydrophilic solvent is selected from the group consisting of butanol, propanol and an aqueous mixture thereof.
- 20 24. A process as claimed in claim 1 wherein the optically active salt is refined at a temperature ranging from 40 to 120°C.
25. A process as claimed in claim 24 wherein the solvent used for refinement is in the range of 20-40% as aqueous solution and one to four times by weight based on the amount of optically active salt used.
- 25 26. A process as claimed in claim 24 wherein the duration of refinement is in the range of 3-5 hrs.
27. A process as claimed in claim 24 wherein the optically active salt is separated after refinement at a temperature in the range of 40 to 70°C.
28. A process as claimed in claim 24 wherein the optically active salt after refinement is
30 separated by filtration or centrifugation.
29. A process as claimed in claim 1 wherein the optically active salt of (+) CPA after refinement is liberated using a mineral or an organic acid.
30. A process as claimed in claim 29 wherein the mineral acid used for liberation of optically active acid is selected from hydrochloric acid and sulphuric acid.

31. A process as claimed in claim 30 wherein the mineral acid is aqueous sulphuric acid.
32. A process as claimed in claim 29 wherein the aqueous mineral acid layer containing amine salt is combined with aqueous mineral acid layer obtained from recovery of the undesired (-) CPA.
- 5 33. A process as claimed in claim 1 wherein the mother liquor enriched with undesired (-) CPA salt obtained after precipitating the desired (+) CPA salt is concentrated at reduced pressure for recovery of (-) CPA.
34. A process as claimed in claim 1 wherein the undesired (-) CPA salt after concentration is treated with aqueous mineral/organic acids and extracted with hydrophilic/hydrophobic
10 organic solvents and concentrated under reduced pressure for obtaining (-) CPA.
35. A process as claimed in claim 34 wherein the mineral acid used for liberation of (-) CPA from its amine salt is selected from hydrochloric acid and sulfuric acid.
36. A process as claimed in claim 35 wherein the mineral acid is aqueous sulfuric acid.
37. A process as claimed in claim 34 wherein the liberated acid is treated with an organic
15 solvent selected from dichloromethane, dichloroethane, chloroform, toluene and hexane.
38. A process as claimed in claim 34 wherein the liberated acid is treated with an organic solvent comprising toluene.
39. A process as claimed in claim 34 wherein the aqueous mineral acid layer containing amine salt is combined with the corresponding aqueous mineral acid layer obtained from
20 the liberation of desired (+) CPA to effect the recovery of optically active resolving agent.
40. A process as claimed in claim 39 aqueous mineral acid layers obtained from liberation of (+) CPA and (-) CPA are mixed, cooled preferably to 10 to 5°C and extracted with aqueous caustic lye solution of concentration ranging from 20-80% to recover the resolving amine employed in resolution of (\pm) CPA.
- 25 41. A process as claimed in claim 40 wherein the concentration of the aqueous lye solution is in the range of 30-60%.
42. A process as claimed in claim 1 wherein the crude amine obtained is used in subsequent batches of (\pm) CPA and the alkaline layer is extracted with an hydrophilic/hydrophobic organic solvent selected from the group consisting of benzene, toluene, hexane,
30 dichloromethane, dichloroethane and chloroform.
43. A process as claimed in claim 42 wherein the solvent is selected from benzene, toluene and hexane.
44. A process as claimed in claim 42 wherein the solvent is toluene.